Biophysical Society

Biophysical Society 61st Meeting, Feb. 11-15, 2017, New Orleans, Louisiana

New Protein Development May Hold the Key to New Disease Therapeutics

A new method that produces a protein essential to autophagy offers new potential to understanding the cellular process and its role in disease

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WASHINGTON, D.C., February 14, 2017 -- The 2016 Nobel Prize in physiology or medicine was awarded the for discoveries of mechanisms of autophagy, a cellular process much like recycling, where new cellular components are generated from old and damaged ones. Though a relatively simple process conceptually, autophagy plays an important role in many physiological processes and genes essential to the process could be a key component for treating diseases.

Now, researchers from the Broad Institute of MIT and Harvard, the University of Dayton, and the University of Texas Southwestern Medical Center have reported the first bacterial creation and functional analysis of a protein essential to initiate autophagy: a human homologous gene of Beclin-1. The researchers will present their findings during the Biophysical Society's 61st Annual Meeting, which will be held Feb. 11-15, 2017, in New Orleans, Louisiana.

Changes in the activity or quantity of Beclin-1 have been shown to cause health problems ranging from cancer to neurodegenerative diseases. In addition, several viruses including HIV and herpes specifically target Beclin-1 in order to evade the body's defense mechanisms. The best-understood inducer of autophagy is starvation, but some of the same components of the autophagy process are also connected to cellular pathways that degrade infectious pathogens.

"While there are many factors that control autophagy, the field agrees that autophagy stops when two molecules of Beclin-1 bind to each other to form a dimer," said Matthew Ranaghan of the Broad Institute. "We ultimately seek to disrupt the inactive Beclin-1 dimer using novel therapeutic molecules to stimulate autophagy in disease states where the process has been hindered or broken."

This research resulted from a partnership forged between the Broad Institute and UT Southwestern Medical Center to develop therapeutics stimulating autophagy for treating infectious pathogens or diseases that result from aggregated proteins, such as the amyloid plaques in Alzheimer's disease.

Beclin-1 is a particularly high-value therapeutic target for several reasons: It plays a central role in autophagy; it is a tumor suppressor; it is embryonically lethal if deleted; and viruses target it to avoid cellular defensive mechanisms.

"Therefore, by developing chemical matter targeting the Beclin-1 dimer or its binding partners that either enhance or diminish autophagy we hope to find new therapeutics," Ranaghan said.

The team first developed methods to produce milligram amounts of a soluble form of the full-length, human homolog of Beclin-1 as a recombinant protein from bacteria. With this achievement they enabled techniques that consume large amounts of protein, making it easier to examine how Beclin-1 interacts with other binding partners that either block or initiate autophagy.

The second step in their research suggested that there is a binding site outside of the traditional domain that promotes the formation of the Beclin-1 dimer. Identifying the specific areas involved in formation and control of the Beclin-1 dimer can help in understanding how a cell turns autophagy on and off.

"The next step to realizing the potential of our research will require development of therapeutic molecules that disrupt interactions between Beclin-1 and proteins that promote formation of the inactive dimer," Ranaghan said. "We are excited that this work enables studies that could lead to real breakthroughs in the treatment of diseases such as cancer and infectious disease."

1689-Pos/B9 "Characterization of the full_length, human beclin-1 purified from *escherichia coli*" is authored by Matthew Ranaghan, Colin Garvie, Doug Daniels, Beth Levin and Jose Perez. It will be at 1:45-3:45 p.m. Central Time on Tuesday, Feb. 14, 2017 in Hall B-2 & C of the Ernest N. Morial Convention Center.
ABSTRACT: http://www.abstractsonline.com/pp8/#!/4279/presentation/3041

MORE MEETING INFORMATION

ABOUT THE MEETING

Each year, the Biophysical Society Annual Meeting brings together more than 6,000 researchers working in the multidisciplinary fields representing biophysics. With more than 3,600 poster presentations, over 200 exhibits, and more than 20 symposia, the BPS Annual Meeting is the largest meeting of biophysicists in the world. Despite its size, the meeting retains its small-meeting flavor through its subgroup symposia, platform sessions, social activities and committee programs. The 61st Annual Meeting will be held at Ernest N. Morial Convention Center in New Orleans, Louisiana.

PRESS REGISTRATION

The Biophysical Society invites professional journalists, freelance science writers and public information officers to attend its Annual Meeting free of charge. For press registration, contact Ellen Weiss at EWeiss@biophysics.org or the Media Line at the American Institute of Physics at media@aip.org or 301-209-3090.

NEWS RELEASES

Embargoed press releases describing in detail some of the breakthroughs to be discussed at the meeting are available on Newswise and Alpha Galileo or by contacting the Media Line at the American Institute of Physics at media@aip.org or 301-209-3090.

QUICK LINKS

Main Meeting Page: http://www.biophysics.org/2017meeting/Home/tabid/6672/Default.aspx
Symposia:
http://www.biophysics.org/2017meeting/Program/ScientificSessions/Symposia/tabid/6756/Default.aspx
Desktop planner: http://www.abstractsonline.com/pp8/#!/4279

ABOUT THE SOCIETY

The Biophysical Society, founded in 1958, is a professional, scientific Society established to encourage development and dissemination of knowledge in biophysics. The Society promotes growth in this expanding field through its annual meeting, monthly journal, and committee and outreach activities. Its 9,000 members are located throughout the U.S. and the world, where they teach and conduct research in colleges, universities, laboratories, government agencies, and industry. For more information on the Society, or the 2017 Annual Meeting, visit http://www.biophysics.org.

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